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Docket No.: 217050US0X CONT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:

GROUP: 1731

Tatsuya ANDOH, et al.

SERIAL NO: 10/015,704

EXAMINER: HUG, E. J.

FILED: December 17, 2001

FOR: COOKING METHOD FOR PULP

DECLARATION UNDER 37 C.F.R. 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

Sir:

Now comes Tatsuya Andoh, who deposes and states that:

1. I am a graduate of Nagoya University and received my Bachelors degree in the year 1987.
2. I have been employed by Kawasaki Kasei Chemicals Ltd. for 16 years as a researcher in the field of quinone cooking.
3. The following experiments were carried out by me or under my direct supervision and control. The experimental results provided below were obtained from published international patent application WO 00/77294, on which I am a named inventor. The experiments show that a cooking liquor containing a quinone provides a more stable than expected increase in yield of pulp when used in the presence of more than 8 g/l of polysulfide sulfur, in comparison to the improvement in yield obtained from a corresponding cooking liquor that does not contain a quinone.
4. I have read and understood JP 07-189153 which was cited by the Examiner as prior art against the claims of the above-identified application.

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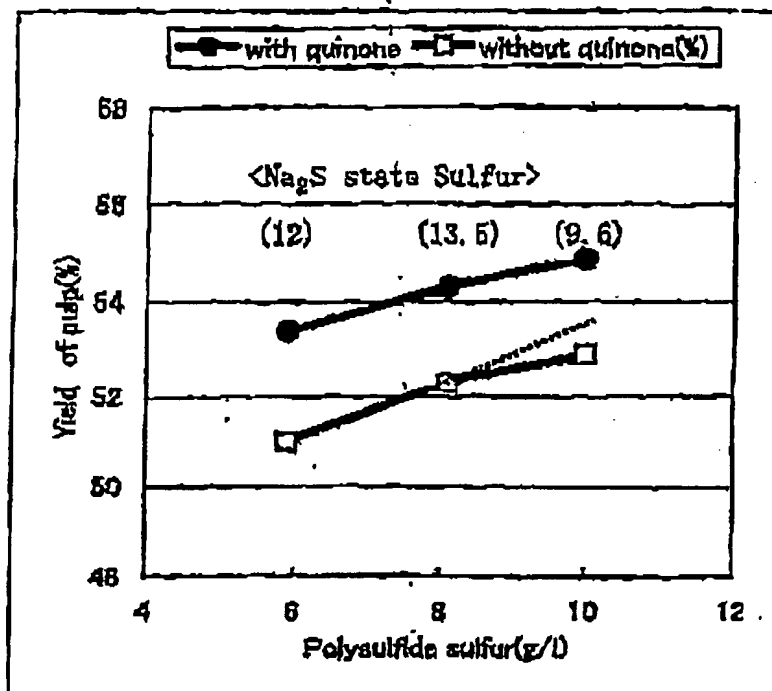
5. The results of Comparative Examples 3 and 4 and Example 2 of WO 00/77294 are tabulated below together with Comparative Examples 1-2 and 5, and Example 1. The data for Comparative Examples 1-2 and 5, and Example 1 were previously submitted for the Office's consideration in a Declaration on January 3, 2005.

	Comparative Example					Example	
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 1	No. 2
Sodium hydroxide (as Na ₂ O) (g/l)	70	70	70	70	70	70	70
Na ₂ S-state sulfur (as Na ₂ O) (g/l)	30	12	13.5	9.6	12	13.5	9.6
Sodium carbonate (as Na ₂ O) (g/l)	15	15	15	15	15	15	15
Sodium thiosulfate (as Na ₂ O) (g/l)	None	3.3	0.8	1	3.3	0.8	1
Polysulfide sulfur (as S) (g/l)	None	5.9	8.1	10	5.9	8.1	10
Added ration of quinone (based on chips) (wt%)	None	None	None	None	0.05	0.05	0.05
Yield of pulp (%)	50.3	51	52.3	52.9	53.4	54.3	54.9

6. The table below shows the improvement in yield of pulp obtained by increasing the amount of polysulfide sulfur above 8 g/l. In the case where quinone is not present, the increase in yield of pulp going from 5.9 to 8.1 g/l of polysulfide sulfur is 1.3% absolute (i.e., the yield of pulp of Comparative Example 2 is 51% and the yield of pulp of Comparative Example 3 is 52.3%, therefore $52.3 - 51 = 1.3\%$). A further increase of yield of pulp of 0.6% is achieved when the amount of polysulfide sulfur is increased to 10 g/l from 8.1 g/l (see Comparative Example 4 in comparison to the 8.1 g/l of Comparative Example 3).

Polysulfide sulfur (as S) (g/l)		5.9	8.1	10
Yield of pulp (%)	With quinone	53.4 (Comp. Ex. 5)	54.3 (Ex. 1)	54.9 (Ex. 2)
	Without quinone	51 (Comp. Ex. 2)	52.3 (Comp. Ex. 3)	52.9 (Comp. Ex. 4)

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7. Examples 1-2 and Comparative Example 5 provides data for the yield of pulp when the cooking process is carried out in the presence of quinone. In each of Examples 1 and 2 and Comparative Example 5, the ratio of quinone is 0.05 wt.%. The improvement in yield of pulp obtained when the polysulfide sulfur is increased from 5.9 to 8.1 g/l is 0.9%. Upon the addition of further polysulfide sulfur to an amount of 10 g/l, a further improvement of 0.6% is obtained. Therefore, in the presence of quinone the improvement in yield of pulp going from 5.9 to 8.1 g/l of polysulfide sulfur is 0.9%. This is followed by a further improvement in yield of pulp of 0.6% when going from a polysulfide sulfur amount of 8.1 to 10 g/l.

8. The improvement in yield of pulp associated with the first increase of polysulfide sulfur in the absence of quinone is 1.3%. This is followed by a further increase in yield of pulp of 0.6%.

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In contrast, the first improvement in yield of pulp when going from 5.9 to 8.1 g/l in the presence of quinone is 0.9%, which is then followed by a 0.6% increase in yield of pulp when increasing the polysulfide sulfur from 8.1 to 10 g/l.

Therefore, the data above show that in the presence of quinone the improvement in yield of pulp obtained by adding polysulfide sulfur above an amount of 8.1 g/l is closer to the yield of pulp improvement obtained when increasing the polysulfide sulfur concentration in lower ranges (i.e., from 5.9 to 8.1 g/l); e.g., the increase in yield of pulp is more stable.

The improvement obtained by adding additional polysulfide sulfur in the absence of quinone in the range of 8.1 - 10 g/l is only 46% of the improvement achieved when going from 5.9 to 8.1 g/l (i.e., $\{[\text{improvement in yield of pulp when increasing polysulfide sulfur from 8.1 to 10 g/l} = 0.6\%] / [\text{improvement in yield of pulp when increasing polysulfide sulfur from 5.9 to 8.1 g/l} = 1.3\%]\} = 46\%$). On the other hand, in the claimed invention where the polysulfide sulfur must be present in an amount of greater than 8.1 g/l, it is shown that the improvement in yield of pulp obtained when the polysulfide sulfur is increased in an amount of greater than 8.1 g/l is 67% (i.e., $\{[\text{improvement in yield of pulp when increasing polysulfide sulfur from 8.1 to 10 g/l} = 0.6\%] / [\text{improvement in yield of pulp when increasing polysulfide sulfur from 5.9 to 8.1 g/l} = 0.9\%]\} = 67\%$).

It is my opinion that the more stable and greater relative improvement in yield of pulp observed in the presence of a quinone when the polysulfide sulfur concentration is increased to an amount greater than 8.1 g/l, in comparison an improvement in yield of pulp when the polysulfide sulfur concentration is increased to an amount that is less than 8.1 g/l, in comparison to corresponding improvements in the absence of quinone, would not be foreseen by those of skill in the art.

9. The relative improvements may be represented graphically as shown in the chart above. The chart shows that improvements in yield of pulp in the presence of a quinone do

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not decrease as much as the amount of polysulfide sulfur is greater than 8.1 g/l, relative to the initial improvement in yield obtained when the polysulfide sulfur concentration is increased from an amount of 5.9 g/l to 8.1 g/l, as compared to the absence of quinone. Therefore, quinone has an unforeseen stabilizing effect on the improvement of yield achievable by increasing polysulfide sulfur.

10. It is further my opinion that the results provided above are statistically and commercially significant. Such cooking operations are carried out on an industrial scale of many millions of tons a year and an improvement such as that obtained by increasing polysulfide sulfur to an amount greater than 8.1 g/l in the presence of a quinone may have a substantial economic effect on such a process.

11. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

12. Further Declarant saith not.

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Tatsuya Andoh
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Date

Nov. 14, 2005